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PARKER AND HASWELL'S ZOOLOGY.

A *Text-Book of Zoology*. By Prof. T. J. Parker, F.R.S., and Prof. W. A. Haswell, F.R.S. Vol. i., pp. xxxix+839. Vol. ii., pp. xx+728. (London: Macmillan and Co., Ltd., 1910.) Price 36s. net, the two vols.

AFTER an interval of thirteen years, this well-known text-book has appeared in a second edition. Its merits have earned for "Parker and Haswell" a high educational rank; the clear, terse descriptions of each selected example of the various classes; the comparison of the class with its exemplar; the abundance and excellence of the illustrations; the brief but useful summaries on general topics, distribution, history, variation. Its drawback has been that whilst containing a good two years' training in the subject-matter of zoology, it does not satisfy the needs of more advanced students. In some ways the new edition makes good this defect, but we are inclined to think that it would have been a gain if a good deal of elementary descriptive matter (such as students invariably obtain in other and smaller works) could have made way for fresh and much-needed descriptions of such examples as a tortoise and a mammal other than a rabbit, or for such a topic as comparative physiology.

The most striking change in the book is the improvement, both in text and in the figures, of the volume that deals with the invertebrata. The vertebrates, on the other hand, remain essentially unaltered. This differential treatment raises an interesting point, for it corresponds very closely with the relative amount of interest taken by students in the two branches of the subject and the relative progress, both in the presentation of, and research into, the subject-matter. Every experienced teacher knows—indeed, the book before us shows—that our knowledge of invertebrates has advanced more rapidly of late years and has a more attractive appeal than our knowledge of the vertebrata. Purely descriptive anatomy takes too large a place in the presentation of the latter. The discussions upon the origin of fins or the morphology of the ear-ossicles still sound on—vague, unsatisfying, unpragmatic. We do not expect our students to know in detail the sclerites of an insect, but we do expect them to know the hard parts of vertebrates. We still regard embryology as something distinct from anatomy, and the sense of dealing with the life-history of a vertebrate in the way in which life-histories are studied among invertebrates is never realised. Embryos are still treated as rarities, the phenomena of colour are omitted or passed over briefly, the questions of heat-production and other problems of vital mechanics are not mentioned. Is it to be wondered at that our students with rare exceptions devote themselves to research on invertebrata or to questions of heredity? A fresh treatment of vertebrate zoology is required. We regret that no attempt is made in this work to put new wine into the old bottles, but we cannot wonder at it. A new bottle is required.

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With regard to the changes made in the first volume, the protozoa are more fully illustrated and described, but the accounts are not equally adequate. For example, the life-histories of the Lobosa are not referred to, the sexual dimorphism in *Sporozoa gregarinida* is not mentioned, and much recent work on forms mentioned or figured is not made use of. The list of fresh-water jellyfish and hydroids on p. 167 omits some interesting recent discoveries. It is, of course, incorrect to repeat the statement of the earlier edition that *Limnocoedium* is only found in Regent's Park. A description of the actual mode of formation of a medusa would have been very welcome. Amongst the few mistakes of nomenclature we must mention *Adamsia* on p. 208 and on Fig. 157. The anemone referred to is obviously not *Adamsia* but *Sagartia parasitica* (to use the older name). The accounts of the various worm-Phyla are much improved and will prove extremely useful. The classification of the Crustacea is quite the modern one, but we miss any account of the recent work on parasitism and sex-production in this class. Fig. 454 is still incorrectly labelled. The treatment of the insects might have been brought a little more up-to-date in view of the increased interest in and knowledge of the housefly and the tsetse-fly, neither of which are noticed. The table of mouth-parts on p. 623 is reprinted without reference apparently to the work which had led to another comparison. The Aptera, a most important order, are treated very summarily, and no mention is made of the discoveries of Silvestri and Berlese, which have revealed since 1907 a new order, the Myrionetomata.

These criticisms, however, do not preclude a generous estimate of the labour which these volumes have cost, nor do they seriously diminish one's estimate of their value. Prof. Haswell is to be congratulated on the appearance of this new edition, which will be greatly appreciated by all teachers, and in the matter of typography and lithography is an excellent example of modern English work.

F. W. GAMBLE.

PAINTS AND PAINTING.

The Materials of the Painter's Craft, in Europe and Egypt from Earliest Times to the end of the Seventeenth Century, with Some Account of their Preparation and Use. By Dr. A. P. Laurie. Pp. xv+444. (London and Edinburgh: J. H. Foulis, 1910.) Price 5s. net.

THE author of this interesting book, which belongs to a series treating of "The Arts and Crafts of the Nations," has gathered within its covers an immense amount of information concerning the materials and methods of painting in early times. Dr. Laurie has been, and is, an indefatigable investigator, especially in connection with ancient processes of mural painting and with the vehicles of mediæval and later days. His chief conclusions, some of which have been published before, as in the little volume on "Greek and Roman Methods of Painting," lately reviewed in these columns, are now made accessible to everyone interested in the subject. One has no longer to search through the back numbers of a journal

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for scattered papers and lectures, but can find in the volume before us a *résumé* of his inquiries, with some additional information, as well as a list of works, old and new, which deal with some or other of the topics discussed in Dr. Laurie's pages. This list occupies nearly fifty pages, and is comprehensive if not precisely exhaustive.

Of the fourteen chapters into which this handbook is divided, not the least important is that which forms the introduction, in which a sketch is drawn of the interdependence of certain crafts, of the development of the processes of painting, of the increase in the number of available pigments, and of changes in the workshop and studio. Then in six successive chapters there are described Egyptian pigments and mediums, and classical methods, such as wax-painting, egg-tempera, and a kind of fresco-painting. The eighth chapter deals with the later history of fresco-painting, and then comes a series of discussions based on the treatises of the monk Theophilus and on the "Book of the Art," by Cennino Cennini. By means of abundant quotation from these authorities and by original comment, Dr. Laurie has certainly succeeded in reproducing "the atmosphere" described in the preface as that "in which these ancient works were carried out." As our author never loses his hold on modern science and modern practice, we commend his appreciative sympathy with the naïve descriptions and utterances of the older writers and historians of art.

"On the painting of illuminated manuscripts" is the heading of the eleventh chapter. There are here some indications of the pigments used in such wonderful productions as the "Book of Kells," and the "Lindisfarne Gospels," both of the seventh century. For instance, we learn that "the Irish monks had learned to extract the purple dye from a species of murex found on the shores of the Irish Channel." Besides Tyrian purple the early Irish illuminators had at their command red lead, several ochres, a green identical with malachite and several lakes. The ink they used is supposed to have owed its blackness entirely to carbon, but a close examination of the writing in the "Lindisfarne Gospels," recently made by the reviewer, indicates, by the presence of a multitude of reddish-brown spots, the employment of a gallo-tannate of iron, like that described by Theophilus. To the subject of lakes and other "adjective" colours, as used in ancient practice and in mediæval days, Dr. Laurie devotes a chapter of twenty-five pages; the employment of dyed cloths as sources of some pigments, as in the case of the red from kermes, or *Coccus ilicis*, is described.

The last two chapters in the book are mainly given up to the study of questions connected with the origin of oil-painting, the making and use of varnishes and the preparation of pigments and of canvas-grounds during the sixteenth and seventeenth centuries. Dr. Laurie admits that he is unable to pronounce definite judgments on all disputed points, but he has certainly contributed valuable material for a solution of some of the problems offered by pictures supposed to have been painted in oil during the fifteenth century.

In the volume under review are included thirteen illustrations, many of them in colour. They are not

merely pleasing enrichments of the text, but serve the purpose of throwing light upon certain descriptive passages.

On the whole, we may consider that the aim of the author has been satisfactorily accomplished and that he has given, within reasonable compass, a fair account, in English, of the varied information scattered very widely in the literature of the art of painting.

In a second edition the author must correct a few slips. For example, the two great lunettes painted by Lord Leighton in the Victoria and Albert Museum are not in true fresco (p. 136), but in spirit-fresco, an oleo-resinous vehicle containing wax. Again, Dr. Laurie has misplaced (p. 334) the Christian names of the brothers van Eyck. Revision is needed elsewhere also, as in the recommendation to use terre verte in true fresco-painting (p. 137); it has proved very treacherous in this country. Then, too, the attribution to Mr. James Ward of the "valuable suggestion, unknown to the older painters, namely, the introduction of asbestos into the plaster to bind it together" (p. 138), does not fit the circumstances. Mr. Ward in his "Fresco Painting," published in 1909, does, it is true, recommend this use of asbestos, but it had been so employed long before, and its adoption had been urged nineteen years previously in a well-known technical manual.

A. H. C.

THE COLLOID STATE OF MATTER.

Kapillarchemie, Eine Darstellung der Chemie der Kolloide und verwandter Gebiete. By Dr. Herbert Freundlich. Pp. viii+591. (Leipzig: Akademische Verlagsgesellschaft m. b. H., 1909.)

THE attention which has been directed during recent years to the colloid state of matter has led to the publication of a very considerable literature, and the subject is rapidly becoming an important section of physical chemistry. We therefore welcome Dr. Freundlich's book as perhaps the most complete attempt to deal with the subject as a whole on the lines of a definite hypothesis, and bring it into clear mathematical relation to physics.

The colloidal state is usually, and possibly always, a two-phased condition, in which one finely-divided substance is suspended in another, and ranges by imperceptible gradation from such suspensions as clay in water or butter-fat in milk to true molecular solutions which to our present means of examination are absolutely homogeneous. In such systems the surfaces of contact between the two phases are of enormous area, and the phenomena of surface-action and especially of surface-tension have an importance of quite a different order to that which they possess in single phases. Dr. Freundlich, indeed, is inclined to consider them essential causes, not merely of the peculiarities of colloid solution, but of adsorption, coprecipitation, and electric cataphoresis, which often bear the closest resemblance to ionic chemical reactions. While, however, the influence of surface or surface-action is the guiding hypothesis of Dr. Freundlich's work, we have been particularly struck with the candid and truly scientific spirit in which he admits its limitations, and states opposing views.